

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: 12/16/2021 – updated 02/08/2022 for phosphorus limits

TO: Sarah Donoughe – NER

FROM: Nicole Krueger – SER *Nicole Krueger*

SUBJECT: Water Quality-Based Effluent Limitations for MSI Express Inc
WPDES Permit No. WI-0069965-08

This is in response to your request for an evaluation of the need for water quality-based effluent limitations (WQBELs) using chapters NR 102, 104, 105, 106, 207, 210, 212, and 217 of the Wisconsin Administrative Code (where applicable), for the discharge from MSI Express Inc in Fond du Lac County. This industrial facility discharges to a channel leading to an unnamed tributary to the West Branch of the Fond du Lac River, located in the Fond du Lac River Watershed in the Upper Fox River Basin. This discharge is included in the Upper Fox and Wolf River Basin TMDL as approved by EPA in February 2020. The evaluation of the permit recommendations is discussed in more detail in the attached report.

Based on our review, the following recommendations are made on a chemical-specific basis at Outfall 001:

Parameter	Daily Maximum	Daily Minimum	Weekly Average	Monthly Average	Six-Month Average	Footnotes
Flow Rate						1,2
BOD ₅						2
TSS	24.9 lbs/day			15.2 lbs/day		3
pH	9.0 s.u.	6.0 s.u.				
Dissolved Oxygen						2
Phosphorus				0.20 lbs/day	0.068 lbs/day	3
Temperature						4

Footnotes:

1. No changes from the current permit.
2. Monitoring only.
3. The TSS and phosphorus mass limits are based on the Total Maximum Daily Load (TMDL) for the Upper Fox and Wolf River Basin TMDL to address water quality impairments within the TMDL area. The TMDL was approved by EPA in February 2020.
4. The following temperature limits are recommended. A compliance schedule may be included. See the temperature section in this memo for compliance options.

Month	Weekly Average Effluent Limitation (°F)	Daily Maximum Effluent Limitation (°F)
JAN	53	
FEB	54	
MAR	56	81
APR	59	
MAY	69	86
JUN	80	88
JUL	85	89

Month	Weekly Average Effluent Limitation (°F)	Daily Maximum Effluent Limitation (°F)
AUG	85	88
SEP	77	86
OCT	65	84
NOV	53	81
DEC	53	

No WET testing is required because information related to the discharge indicates low to no risk for toxicity.

The recommended limits meet the expression of limits requirements in ss. NR 106.07 and NR 205.065(7), Wis. Adm. Codes, and additional limits are not required.

Please consult the attached report for details regarding the above recommendations. If there are any questions or comments, please contact Nicole Krueger at Nicole.Krueger@wisconsin.gov or Diane Figiel at Diane.Figiel@wisconsin.gov.

Attachments (3) – Narrative, Map, & Thermal Table

PREPARED BY: Nicole Krueger, Water Resources Engineer – SER

E-cc: Mark Stanek, Wastewater Engineer – NER
Heidi Schmitt Marquez, Regional Wastewater Supervisor – NER
Diane Figiel, Water Resources Engineer – WY/3

Attachment #1
**Water Quality-Based Effluent Limitations for
MSI Express Inc**

WPDES Permit No. WI-0069965-08

Prepared by: Nicole Krueger

PART 1 – BACKGROUND INFORMATION

Facility Description

This facility packages aseptic fruit juices. High strength wastewater is captured in a 13,000-gallon tank and is hauled to a wastewater treatment facility/anaerobic digester for final disposal. NCCW and boiler backwash are discharged to surface water directly.

Attachment #2 is a map of the area showing the approximate location of Outfall 001.

Existing Permit Limitations

The current permit, expiring on 03/31/2022, includes the following effluent limitations and monitoring requirements.

Parameter	Footnotes
Flow Rate	1
Temperature	1
Phosphorus	1

Footnotes:

1. Monitoring only

Receiving Water Information

- Name: Unnamed tributary to the West Branch Fond du Lac River
 - A DNR biologist visited the discharge site on 11/15/2021. At the outfall, it was observed that the effluent flows into a farm field which is tiled. The drain tile flows for about 1500' and daylights at the unnamed tributary to the West Branch Fond du Lac River. The biologist did not observe aquatic life immediately at the outfall and limits are applied where the drain tile discharges to the unnamed tributary to the West Branch Fond du Lac River.
- Waterbody Identification Code (WBIC): 134800
- Classification used in accordance with chs. NR 102 and 104, Wis. Adm. Code: Warm Water Sport Fish (WWSF) community, non-public water supply at the unnamed tributary.
- Low flows used in accordance with chs. NR 106 and 217, Wis. Adm. Code: The following 7-Q₁₀ and 7-Q₂ values are estimated from USGS, where Outfall 001 is located.
 - 7-Q₁₀ = 0 cfs (cubic feet per second)
 - 7-Q₂ = 0 cfs
- % of low flow used to calculate limits in accordance with s. NR 106.06(4)(c)5., Wis. Adm. Code: Not applicable where the receiving water low flows are zero.
- Source of background concentration data: Background concentrations are not included because they don't impact the calculated WQBEL when the receiving water low flows are equal to zero.
- Multiple dischargers: None

Attachment #1

- Impaired water status: The immediate receiving water is not impaired. The West Branch of the Fond du Lac River approximately 1½ miles downstream is 303(d) listed as impaired for total phosphorus.

Effluent Information

- Flow rate(s):
Annual average = 0.10 MGD (Million Gallons per Day)
For reference, the actual average flow from 04/01/2017 to 09/30/2021 was 0.09 MGD.
- Acute dilution factor used in accordance with s. NR 106.06(3)(c), Wis. Adm. Code: Not applicable – this facility does not have an approved Zone of Initial Dilution (ZID).
- Water source: Private well.
- Additives: None.
- Effluent characterization: This facility is categorized as a secondary industry, so the permit application required effluent sample analyses for a limited number of common pollutants, as specified in s. NR 200.065, Table 1, Wis. Adm. Code, such as ammonia, chloride, and chlorine.
- Effluent data for substances for which a single sample was analyzed is shown in the tables in Part 2 below, in the column titled “MEAN EFFL. CONC.”. Otherwise, substances with multiple effluent data are shown in the tables below or in their respective parts in this evaluation.

PART 2 – pH

MSI Express does not currently have pH limits. The criteria for fish and aquatic life for pH per NR 102.04(4)(c), Wis. Adm. Code is 6.0 to 9.0 s.u. Therefore, it is recommended that pH limits of 6.0 s.u. as a daily minimum and 9.0 s.u. as a daily maximum be included in the reissued permit.

PART 3 - BOD₅

In establishing BOD₅ (Biochemical Oxygen Demand) limitations, the primary intent is to prevent a lowering of dissolved oxygen levels in the receiving water below water quality standards as specified in ss. NR 102.04(4)(a) and (b). The 26-lb method is the most frequently used approach for calculating BOD₅ limits when resources are not available to develop a detailed water quality model. This simplified model was developed in the 1970's by the Wisconsin Committee on Water Pollution on the Fox, Wisconsin, Oconto, and Flambeau Rivers. Further studies throughout the 1970's proved this model to be relatively accurate. The model has since then been used by the Department on many occasions when resources are not available to perform a site-specific model. The "26" value stems from the following equation:

$$\frac{26 \text{ lbs/day}}{\text{ft}^3/\text{sec}} * \frac{1 \text{ day}}{86,400 \text{ sec}} * \frac{454,000 \text{ mg}}{\text{lbs}} * \frac{1 \text{ ft}^3}{28.32 \text{ L}} = 4.8 = 2.4 * 2 \text{ mg/L}$$

The 4.8 has been calculated by taking 2.4 which is the number one receives when converting 26 lbs of BOD/day/cfs into mg/L, multiplied by 2.0 which is the change in the DO level. A typical background DO level for Wisconsin waters is 7 mg/L, so a 2 mg/L decrease is allowed in order to meet the 5 mg/L standard for warm water streams. The above relationship is temperature dependent and an appropriate temperature correction factor is applied. The 26-lb method is based on a typical 24°C summer value for warm water streams. Adjustments for temperature are made using the following equation:

$$k_t = k_{24} (0.967^{(T-24)})$$

Where k_{24} = 26 lbs of BOD/day/cfs

Calculations based on Full Assimilative Capacity at 7Q10 Conditions:

$$Limitation(mg / L) = 2.4(DO_{stream} - DO_{std}) \left(\frac{({}_7Q_{10} + Q_{eff})}{Q_{eff}} \right) (0.967^{(T-24)})$$

Where:

Q_{eff} = effluent design flow = 0.10 MGD

DO_{stream} = background dissolved oxygen = 7 mg/L

DO_{std} = dissolved oxygen criteria from s. NR 102.04(4) = 5.0

${}_7Q_{10}$ = 0 cfs

T = Receiving water temperature from s. NR 102.25

Because no dilution is available in the receiving water, the calculated limits would be the lowest that the Department typically gives to facilities. The recommended effluent limitations would be 5 mg/L as a weekly average from May through October and 10 mg/L November through April (rounded to two significant digits). The Department normally doesn't give BOD₅ mass limits when the stream is effluent dominated. Given that these limitations are the lowest that the Department would typically give to a facility, these limitations shall be considered at those needed to prevent significant lowering of water quality.

Based on the available biological data, BOD₅ effluent quality in the 5 to 10 mg/L range is capable of supporting a diverse fish and aquatic life community in small effluent dominated warm water streams. The recommended effluent dissolved oxygen limitation would be 7.0 mg/L as a daily minimum.

The available BOD₅ data from the previous two permit applications are summarized below:

BOD₅ Effluent Data

Sample Date	BOD ₅ mg/L
03/17/2010	2.7
07/19/2016	2.6
05/19/2021	<2.0

Because of the low effluent concentrations compared to the calculated weekly average limits, no BOD₅ limits are recommended. **One year of BOD₅ and dissolved oxygen monitoring is recommended** in the reissued permit to determine reasonable potential for limits at the next reissuance.

PART 4 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR TOXIC SUBSTANCES – EXCEPT AMMONIA NITROGEN

Permit limits for toxic substances are required whenever any of the following occur:

1. The maximum effluent concentration exceeds the calculated limit (s. NR 106.05(3), Wis. Adm. Code)
2. If 11 or more detected results are available in the effluent, the upper 99th percentile (or P₉₉) value exceeds the comparable calculated limit (s. NR 106.05(4), Wis. Adm. Code)
3. If fewer than 11 detected results are available, the mean effluent concentration exceeds 1/5 of the calculated limit (s. NR 106.05(6), Wis. Adm. Code)

Acute Limits based on 1-Q₁₀

Daily maximum effluent limitations for toxic substances are based on the acute toxicity criteria (ATC), listed in ch. NR 105, Wis. Adm. Code. Previously daily maximum limits for toxic substances were calculated as two times the ATC. However, changes to ch. NR 106, Wis. Adm. Code, (September 1, 2016) require the Department to calculate acute limitations using the same mass balance equation as used for other limits along with the 1-Q₁₀ receiving water low flow to determine if more restrictive effluent limitations are needed to protect the receiving stream from discharges which may cause or contribute to an exceedance of the acute water quality standards. The mass balance equation is provided below.

$$\text{Limitation} = \frac{(\text{WQC}) (Q_s + (1-f) Q_e) - (Q_s - f Q_e) (C_s)}{Q_e}$$

Where:

WQC = Acute toxicity criterion or secondary acute value according to ch. NR 105, Wis. Adm. Code.

Q_s = average minimum 1-day flow which occurs once in 10 years (1-day Q₁₀)
if the 1-day Q₁₀ flow data is not available = 80% of the average minimum 7-day flow which occurs once in 10 years (7-day Q₁₀).

Q_e = Effluent flow (in units of volume per unit time) as specified in s. NR 106.06(4)(d), Wis. Adm. Code.

f = Fraction of the effluent flow that is withdrawn from the receiving water, and

C_s = Background concentration of the substance (in units of mass per unit volume) as specified in s. NR 106.06(4)(e), Wis. Adm. Code.

If the receiving water is effluent dominated under low stream flow conditions, the 1-Q₁₀ method of limit calculation produces the most stringent daily maximum limitations and should be used while making reasonable potential determinations. This is the case for MSI Express.

The following tables list the calculated WQBELs for this discharge along with the results of effluent sampling. All concentrations are expressed in terms of micrograms per Liter (µg/L), except for hardness and chloride (mg/L).

Daily Maximum Limits based on Acute Toxicity Criteria (ATC)

RECEIVING WATER FLOW = 0 cfs

SUBSTANCE	ATC	MAX. EFFL. LIMIT*	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Chlorine	19.0	19.0	3.81	<20
Chloride (mg/L)	757	757	151	6.0

*Per the changes to s. NR 106.07(3), Wis. Adm. Code, effective 09/01/2016 consideration of ambient concentrations and 1-Q₁₀ flow rates yields a more restrictive limit than the 2 × ATC method of limit calculation.

Weekly Average Limits based on Chronic Toxicity Criteria (CTC)

RECEIVING WATER FLOW = 0 cfs

SUBSTANCE	CTC	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Chlorine	7.28	7.28	1.46	<20

Attachment #1

SUBSTANCE	CTC	WEEKLY AVE. LIMIT	1/5 OF EFFL. LIMIT	MEAN EFFL. CONC.
Chloride (mg/L)	395	395	79.0	6.0

Conclusions and Recommendations

Based on a comparison of the effluent data and calculated effluent limitations, no effluent limitations or monitoring are required for toxic substances in this section.

**PART 5 – WATER QUALITY-BASED EFFLUENT LIMITATIONS
FOR AMMONIA NITROGEN**

The State of Wisconsin promulgated revised water quality standards for ammonia nitrogen in ch. NR 105, Wis. Adm. Code, effective March 1, 2004 which includes criteria based on both acute and chronic toxicity to aquatic life. Given the fact that MSI Express does not currently have ammonia nitrogen limits, the need for limits is evaluated at this time.

Effluent Ammonia Data

Sample Date	Ammonia Nitrogen mg/L
03/17/2010	0.42
07/19/2016	0.15
05/19/2021	<0.24

These concentrations are low, and well below any of the water quality-based effluent limits based on the applicable acute and chronic criteria for the receiving water. Therefore, **no water quality-based effluent limits or monitoring for ammonia nitrogen are recommended in the reissued permit.**

PART 6 – PHOSPHORUS**Technology-Based Effluent Limit**

Subchapter II of Chapter NR 217, Wis. Adm. Code, requires industrial facilities that discharge greater than 60 pounds of Total Phosphorus per month to comply with a monthly average limit of 1.0 mg/L, or an approved alternative concentration limit.

Because MSI Express does not currently have an existing technology-based limit, the need for this limit in the reissued permit is evaluated. The data demonstrates that the annual monthly average phosphorus loading is less than 60 lbs/month, which is the threshold for industrial facilities in accordance to s. NR 217.04(1)(a)2, Wis. Adm. Code, and therefore no technology-based limit is required.

Annual Average Mass Total Phosphorus Loading

Month	Monthly Avg. mg/L	Total Flow MG/month	Total Phosphorus lb./mo.
Jan 2021	0.17	2.85	4.0
Feb 2021	0.05	2.58	1.2
March 2021	0.04	2.85	1.0
May 2021	0.04	2.85	1.2

Attachment #1

June 2021	0.10	2.76	1.0
July 2021	0.04	2.76	2.4
Aug 2021	0.04	2.85	0.9
Average			12.6

Total P (lbs/month) = Monthly average (mg/L) × total flow (MG/month) × 8.34 (lbs/gallon)
Where total flow is the sum of the actual (not design) flow (in MGD) for that month

In addition, the need for a WQBEL for phosphorus must be considered.

TMDL Limits – Phosphorus

Total phosphorus (TP) effluent limits in lbs/day are calculated as recommended in the *TMDL Development and Implementation Guidance: Integrating the WPDES and Impaired Waters Programs* (April 2020) and are based on the annual phosphorus wasteload allocation (WLA) given in pounds per year. This WLA found in Appendix H of the *Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids in the Upper Fox and Wolf River Basins (UFW TMDL)* report dated February 2020 are expressed as maximum annual loads (lbs/year). The annual WLA for MSI Express is 13 lbs/year.

For the reasons explained in the April 30, 2012 paper entitled *Justification for Use of Monthly, Growing Season and Annual Average Periods for Expression of WPDES Permit Limits for Phosphorus Discharges in Wisconsin*, WDNR has determined that the phosphorus WQBELs set equal to WLAs would not be consistent with the assumptions and requirements of the TMDL. Therefore, limits given to facilities included in the Upper Fox and Wolf River Basins TMDL are given monthly average mass limits and, if the equivalent effluent concentration is less than or equal to 0.3 mg/L, six-month average mass limits are also included. The following equation shows the calculation of equivalent effluent concentration:

$$\begin{aligned}\text{TP Equivalent Effluent Concentration} &= \text{WLA} \div (365 \text{ days/yr} * \text{Flow Rate} * \text{Conversion Factor}) \\ &= 13 \text{ lbs/yr} \div (365 \text{ days/yr} * 0.10 \text{ MGD} * 8.34) \\ &= 0.043 \text{ mg/L}\end{aligned}$$

Since this value is less than 0.3 mg/L, both a six-month average mass limit and a monthly average mass limit are applicable for total phosphorus. The monthly average limit is set equal to three times the six-month average limit.

$$\begin{aligned}\text{TP 6-Month Average Permit Limit} &= \text{WLA} \div 365 \text{ days/yr} * \text{multiplier} \\ &= (13 \text{ lbs/yr} \div 365 \text{ days/yr}) * 1.90 \\ &= 0.068 \text{ lbs/day}\end{aligned}$$

$$\begin{aligned}\text{TP Monthly Average Permit Limit} &= \text{TP 6-Month Average Permit Limit} * 3 \\ &= 0.068 \text{ lbs/day} * 3 \\ &= 0.20 \text{ lbs/day}\end{aligned}$$

The multiplier used in the six-month average calculation was determined according to the implementation guidance. Because there is less than a year's worth of representative phosphorus data, a CV of 0.6 is used because it's the maximum anticipated coefficient of variation expected. This value, along with monitoring frequency, is used to select the multiplier. The current permit specifies phosphorus monitoring as weekly; if a different monitoring frequency is used, the stated limits should be reevaluated.

Attachment #1

Monthly average and six-month average mass effluent limits are recommended for this discharge. The limits are equivalent to a concentration of 0.24 mg/L and 0.081 mg/L at the maximum annual average flow of 0.10 MGD.

The UFW TMDL establishes TP wasteload allocations to reduce the loading in the entire watershed including WLAs to meet water quality standards for tributaries to the Upper Fox and Wolf River. Therefore, WLA-based WQBELs are protective of immediate receiving waters and TP WQBELs derived according to s. NR 217.13, Wis. Adm. Code are not required.

Since wasteload allocations are expressed as annual loads (lbs/yr), permits with TMDL-derived monthly average permit limits should require the permittee to calculate and report rolling 12-month sums of total monthly loads for TP. Rolling 12-month sums can be compared directly to the annual wasteload allocation.

Effluent Data

The following table summarizes effluent total phosphorus monitoring data from January 2021 to August 2021. Data prior to this was not included in this summary because the samples were collected near a manhole that had storm water contributions. The data used in this evaluation was just the NCCW without the mixing of storm water.

Total Phosphorus Effluent Data

Date	Phosphorus mg/L	Phosphorus lbs/day
1/13/2021	0.17	0.130
2/18/2021	0.05	0.038
3/17/2021	0.04	0.031
4/15/2021	0.04	0.038
5/11/2021	0.10	0.031
6/17/2021	0.04	0.077
7/16/2021	0.04	0.031
8/27/2021	0.04	0.031

The facility can currently meet the TMDL limits and a compliance schedule is not necessary.

PART 7 – TOTAL SUSPENDED SOLIDS

Total Suspended Solids (TSS) effluent limits in lbs/day are calculated as recommended in the *TMDL Development and Implementation Guidance: Integrating the WPDES and Impaired Waters Programs* (April 2020). This WLAs found in Appendix I of the *Total Maximum Daily Loads for Total Phosphorus and Total Suspended Solids in the Upper Fox and Wolf Basins (UFW TMDL)* report dated February 2020 are expressed as maximum annual loads (lbs/year). The annual WLA for MSI Express is 2,803 lbs/year.

Revisions to chs. NR 106 and 205, Wis. Adm. Code align Wisconsin water quality-based effluent limits with 40 CFR 122.45(d), which requires WPDES permits to contain the following concentration limits, whenever practicable and necessary to protect water quality:

- Weekly average and monthly average limitations for continuous discharges subject to ch. NR 210.
- Daily maximum and monthly average limitations for all other discharges.

Attachment #1

MSI Express is an industrial facility and is therefore subject to daily maximum and monthly average TSS limits derived from TSS annual WLAs.

$$\begin{aligned}\text{TSS Daily Max Permit Limit} &= \text{Daily WLA} * \text{Daily multiplier} \\ &= 8 \text{ lbs/day} * 3.11 \\ &= 24.9 \text{ lbs/day}\end{aligned}$$

$$\begin{aligned}\text{TSS Monthly Average Permit Limit} &= \text{Daily WLA} * \text{Monthly multiplier} \\ &= 8 \text{ lbs/day} * 1.90 \\ &= 15.2 \text{ lbs/day}\end{aligned}$$

The multiplier used in the daily max and monthly average calculation was determined according to implementation guidance. Because there is limited data (3 available samples) the coefficient of variation used to calculate limits is the default 0.6. This value, along with monitoring frequency, is used to select the multiplier. EPA's technical support document recommends a minimum of weekly monitoring; if a different monitoring frequency is used, the stated limits should be reevaluated.

Daily maximum and monthly average mass effluent limits are recommended for this discharge. The limits are equivalent to a concentration of 29.8 mg/L and 18.2 mg/L at the facility design maximum annual average flow of 0.09 MGD.

There is limited TSS data available for MSI Express. The samples collected from the last three permit applications are summarized below:

TSS Data

Sample Date	TSS mg/L
03/17/2010	13
07/19/2016	8.0
05/19/2021	5.0

Because there is limited data for this facility, a short compliance schedule may be included in the reissued permit.

Since wasteload allocations are expressed as annual loads (lbs/yr), permits with TMDL-derived monthly average permit limits should require the permittee to calculate and report rolling 12-month sums of total monthly loads for TSS. Rolling 12-month sums can be compared directly to the annual wasteload allocation.

PART 8 – WATER QUALITY-BASED EFFLUENT LIMITATIONS FOR THERMAL

Surface water quality standards for temperature took effect on October 1, 2010. These regulations are detailed in chs. NR 102 (Subchapter II – Water Quality Standards for Temperature) and NR 106 (Subchapter V – Effluent Limitations for Temperature) of the Wisconsin Administrative Code. Daily maximum and weekly average temperature criteria are available for the 12 different months of the year depending on the receiving water classification.

In accordance with s. NR 106.53(2)(b), Wis. Adm. Code, the highest daily maximum flow rate for a

Attachment #1

calendar month is used to determine the acute (daily maximum) effluent limitation. In accordance with s. NR 106.53(2)(c), Wis. Adm. Code, the highest 7-day rolling average flow rate for a calendar month is used to determine the sub-lethal (weekly average) effluent limitation. These values were based off actual flow reported from 04/01/2017 to 09/30/2021.

A heat loss equation is used to adjust the calculated limit based upon the length of the storm sewer/storm water conveyance channel before discharge to waters of the state, because the discharge is to a drain tile to the unnamed tributary. The discharge from permit Outfall 001 travels through at least 1500' of drain tile before reaching the unnamed tributary. Under s. NR 106.55(5), Wis. Adm. Code, the default cooling rate is estimated as 1° F for every 400 feet of storm sewer/storm water conveyance channel. The adjusted limits are shown in the table.

The table below summarizes the maximum temperatures reported during monitoring from 04/01/2017 to 09/30/2021. The heat loss adjusted calculated limits are in the middle columns and the non-adjusted calculated limits (equal to criteria) are in the right columns.

Monthly Temperature Effluent Data & Limits

Month	Representative Highest Monthly Effluent Temperature		Adjusted Calculated Effluent Limits		Calculated Effluent Limits	
	Weekly Maximum	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation
	(°F)	(°F)	(°F)	(°F)	(°F)	(°F)
JAN	68	79	53	80	49	76
FEB	64	74	54	80	50	76
MAR	72	82	56	81	52	77
APR	71	80	59	83	55	79
MAY	80	90	69	86	65	82
JUN	88	95	80	88	76	84
JUL	91	95	85	89	81	85
AUG	87	89	85	88	81	84
SEP	86	91	77	86	73	82
OCT	80	90	65	84	61	80
NOV	70	93	53	81	49	77
DEC	70	79	53	80	49	76

Reasonable Potential

Permit limits for temperature are recommended based on the procedures in s. NR 106.56, Wis. Adm. Code.

- An acute limit for temperature is recommended for each month in which the representative daily maximum effluent temperature for that month exceeds the acute WQBEL. The representative daily maximum effluent temperature is the greater of the following:
 - The highest recorded representative daily maximum effluent temperature

Attachment #1

- (b) The projected 99th percentile of all representative daily maximum effluent temperatures
- A sub-lethal limitation for temperature is recommended for each month in which the representative weekly average effluent temperature for that month exceeds the weekly average WQBEL. The representative weekly average effluent temperature is the greater of the following:
 - (a) The highest weekly average effluent temperature for the month.
 - (b) The projected 99th percentile of all representative weekly average effluent temperatures for the month

Comparing the representative highest effluent temperature to the calculated effluent limits determines the reasonable potential of exceeding the effluent limits. The months in which limitations are recommended are shown in bold. Based on this analysis, daily maximum temperature limits are needed for the months of March and May – November and weekly average temperature maximum limits are necessary for all months. A compliance schedule may be included in the reissued permit for temperature limits.

MSI has the option to monitor data at the outlet of the drain tile where the effluent meets the unnamed tributary. If MSI chooses this option, the non-adjusted limits (equal to criteria) will apply instead.

The following general options are available for a facility to explore potential relief from the temperature limits:

- Effluent monitoring data: Verification or additional effluent monitoring (flow and/or temperature) may be appropriate if there were questions on the representativeness of the current effluent data.
- Monthly low receiving water flows: Contract with USGS to generate monthly low flow estimates for the receiving water to be used in place of the annual low flow.
- Collection of site-specific ambient temperature: default background temperatures for streams in Wisconsin, so actual data from the direct receiving water may provide for relaxed thermal limits but only if the site-specific temperatures are lower than the small stream defaults used in the above tables
- A variance to the water quality standard: This is typically considered to be the least preferable and most complex option as it requires the evaluation of the other alternatives.

These options are explained in additional detail in the August 15, 2013 Department *Guidance for Implementation of Wisconsin's Thermal Water Quality Standards*
<http://dnr.wi.gov/topic/surfacewater/documents/ThermalGuidance2edition8152013.pdf>

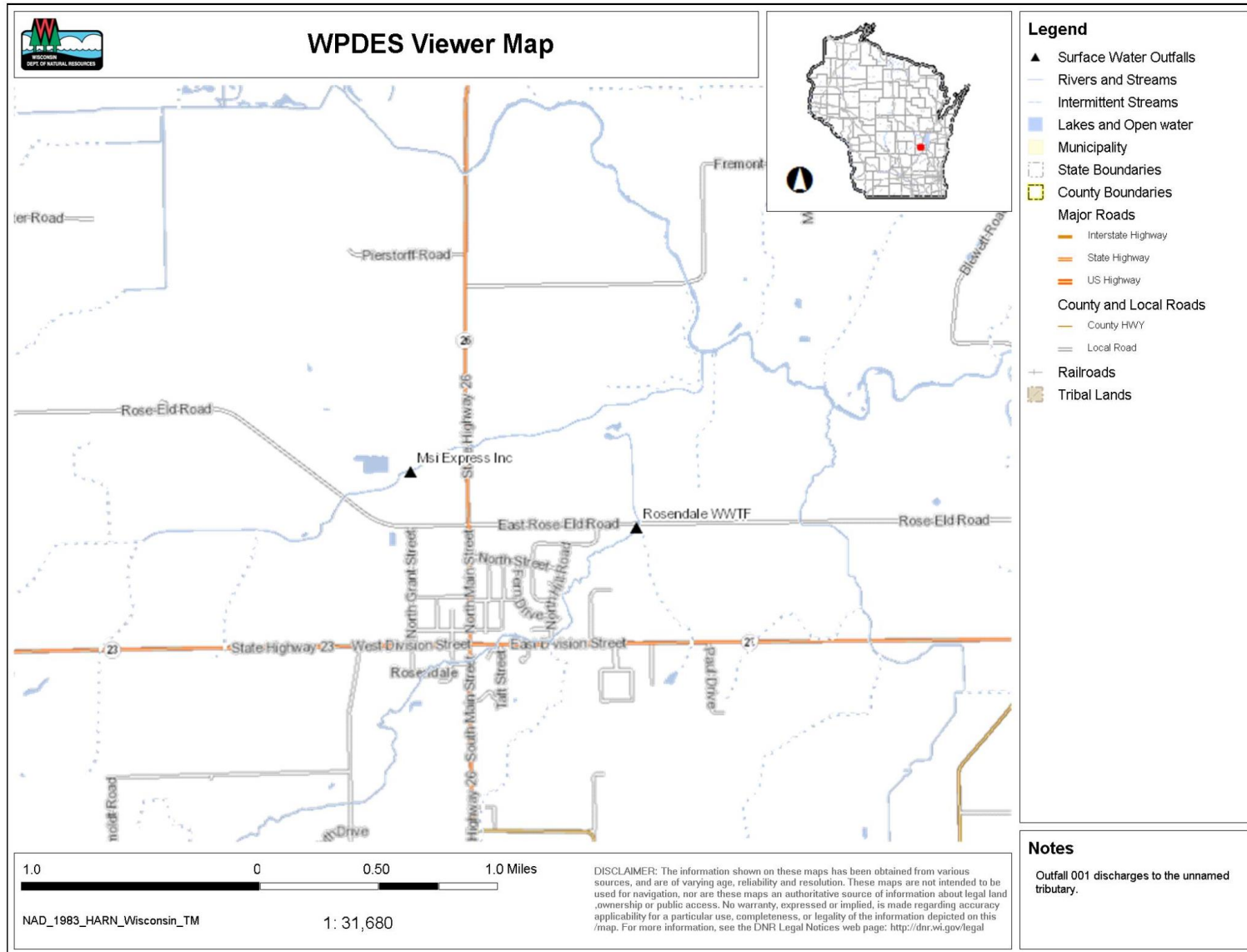
PART 9 – WHOLE EFFLUENT TOXICITY (WET)

WET testing is used to measure, predict, and control the discharge of toxic materials that may be harmful to aquatic life. In WET tests, organisms are exposed to a series of effluent concentrations for a given time and effects are recorded. Decisions below related to the selection of representative data and the need for WET limits were made according to ss. NR 106.08 and 106.09, Wis. Adm. Code. WET monitoring frequency and toxicity reduction evaluation (TRE) recommendations were made using the best professional judgment of staff familiar with the discharge after consideration of the guidance in the *Whole Effluent Toxicity (WET) Program Guidance Document (October 29, 2019)*.

Outfall 001 is comprised primarily of NCCW and boiler backwash with no additives. The discharge does not have a history of WET failures and no toxic compounds are expected at levels of concern. Since there

Attachment #1

is believed to be a very low risk of toxicity, WET testing is not recommended during the reissued permit term.



Temperature limits for receiving waters with unidirectional flow

(calculation using default ambient temperature data)

Facility:	MSI Express		7-Q₁₀:	0.00	cfs	Temp Dates		Flow Dates	
Outfall(s):	001		Dilution:	25%		Start:	04/01/17	04/01/17	
Date Prepared:	11/17/2021		f:	0		End:	09/30/21	09/30/21	
Design Flow (Q_e):	0.10	MGD	Stream type:	Small warm water sport or forage fish co					
Storm Sewer Dist.	1500	ft	Qs:Q_e ratio:	0.0	:1				
			Calculation Needed?	YES					

Month	Water Quality Criteria			Receiving Water Flow Rate (Qs) (cfs)	Representative Highest Effluent Flow Rate (Q _e)		f	Representative Highest Monthly Effluent Temperature		Calculated Effluent Limit		Adjusted Thermal Limits	
	T _a (default)	Sub-Lethal WQC	Acute WQC		7-day Rolling Average (Q _{esl})	Daily Maximum Flow Rate (Q _{ea})		Weekly Average	Daily Maximum	Weekly Average Effluent Limitation	Daily Maximum Effluent Limitation	Weekly Average	Daily Maximum
	(°F)	(°F)	(°F)		(MGD)	(MGD)		(°F)	(°F)	(°F)	(°F)	(°F)	(°F)
JAN	33	49	76	0.00	0.210	0.920	0	68	79	49	76	53	80
FEB	34	50	76	0.00	0.092	0.092	0	64	74	50	76	54	80
MAR	38	52	77	0.00	0.092	0.092	0	72	82	52	77	56	81
APR	48	55	79	0.00	0.092	0.092	0	71	80	55	79	59	83
MAY	58	65	82	0.00	0.092	0.092	0	80	90	65	82	69	86
JUN	66	76	84	0.00	0.092	0.092	0	88	95	76	84	80	88
JUL	69	81	85	0.00	0.092	0.092	0	91	95	81	85	85	89
AUG	67	81	84	0.00	0.092	0.092	0	87	89	81	84	85	88
SEP	60	73	82	0.00	0.092	0.092	0	86	91	73	82	77	86
OCT	50	61	80	0.00	0.092	0.092	0	80	90	61	80	65	84
NOV	40	49	77	0.00	0.093	0.096	0	70	93	49	77	53	81
DEC	35	49	76	0.00	0.210	0.920	0	70	79	49	76	53	80